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(71) Applicant
Checkrobot Inc (USA-Delaware),
160 Southwest 12th Avenue, Deerfield Beach, Florida
33441, United States of America

(72) Inventors
David R Humble
David L Gentzler
Steven J Tildetzke

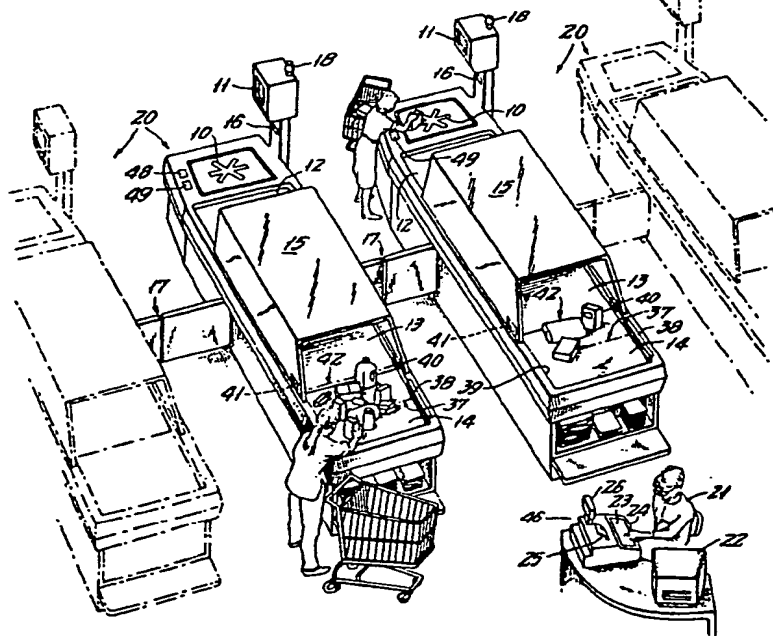
(74) Agent and/or Address for Service
Mewburn Ellis & Co.,
2/3 Cursitor Street, London EC4A 1BQ

(58) Field of search
G4H
G1W

(54) System for security processing of retail articles

(57) A system for processing articles selected for purchase and bearing distinct identification codes comprises, in one version: (a) a code reader (10); (b) a conveyor (12); (c) an entrance sentry for defining an inlet to a secured zone extending along a portion of the conveyor; (d) a sensor for sensing a measurable characteristic (e.g. weight and/or height) of an article; and (e) a controller which compares the measured value(s) with stored value(s) selected by the identification code and controls the conveyor accordingly. Other versions include a second reading of article identification code in the secured zone and comparison thereof with the code read in (a) above, comparison of measured weight with stored weight and electronic article surveillance (EAS) testing in conjunction with stored EAS information regarding marker-tagged articles.

FIG. 1.



The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

FIG. 1.

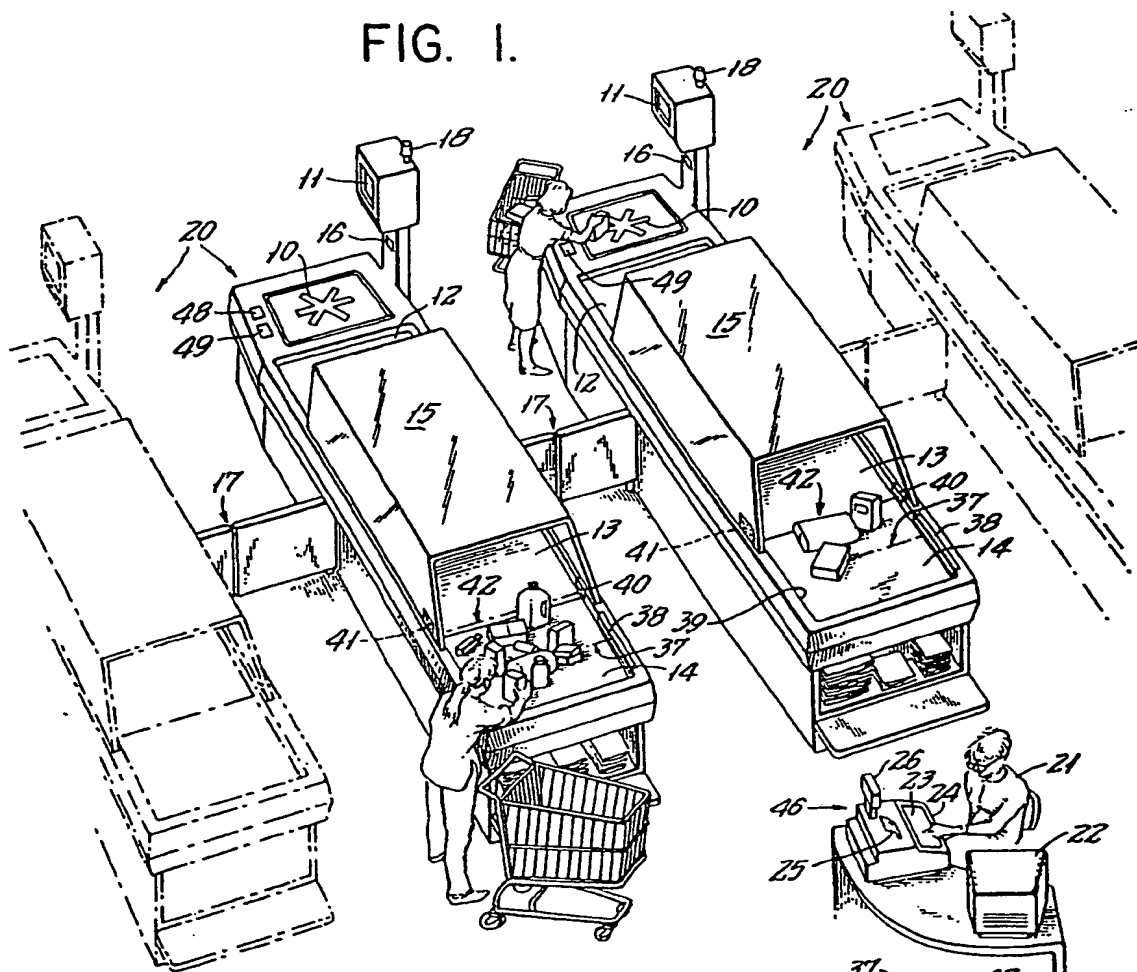
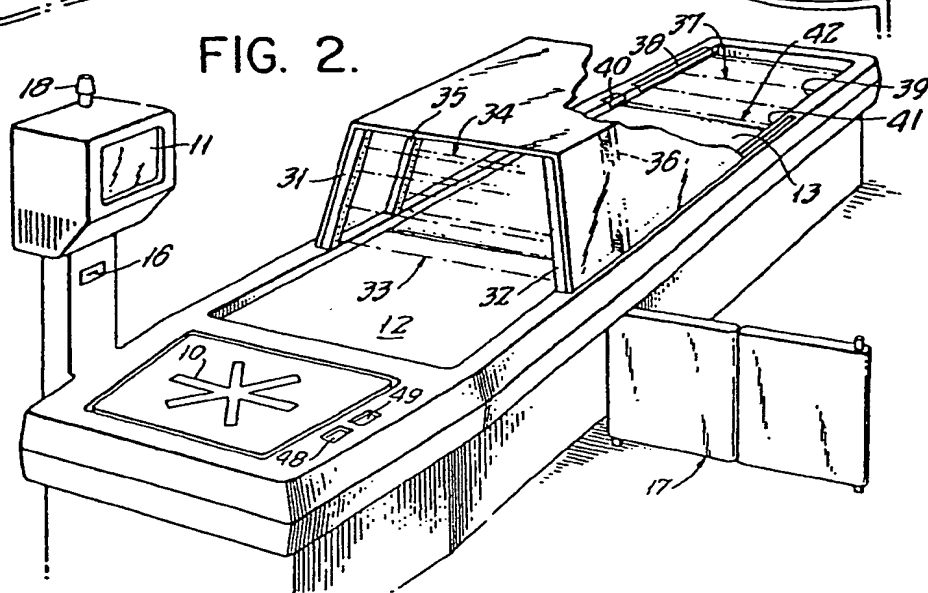


FIG. 2.



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FIG. 3.

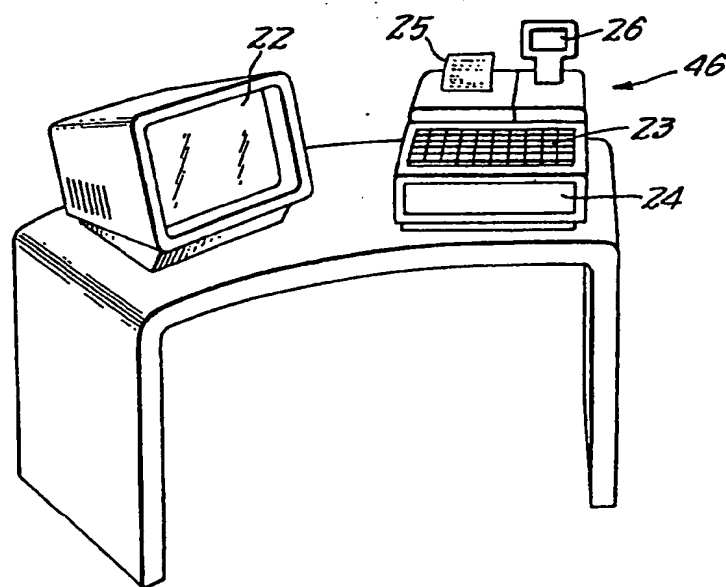


FIG. 4.

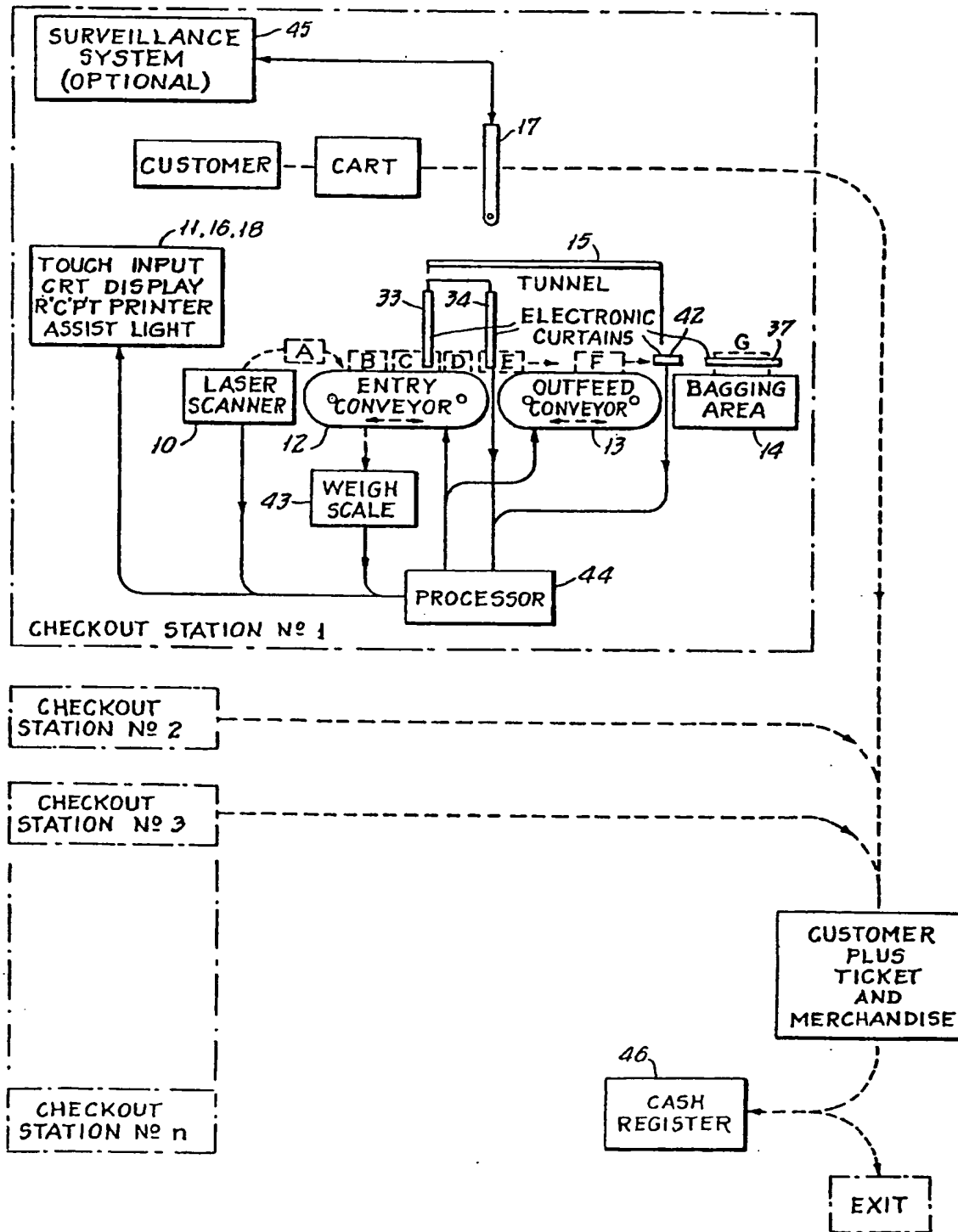


FIG. 5.

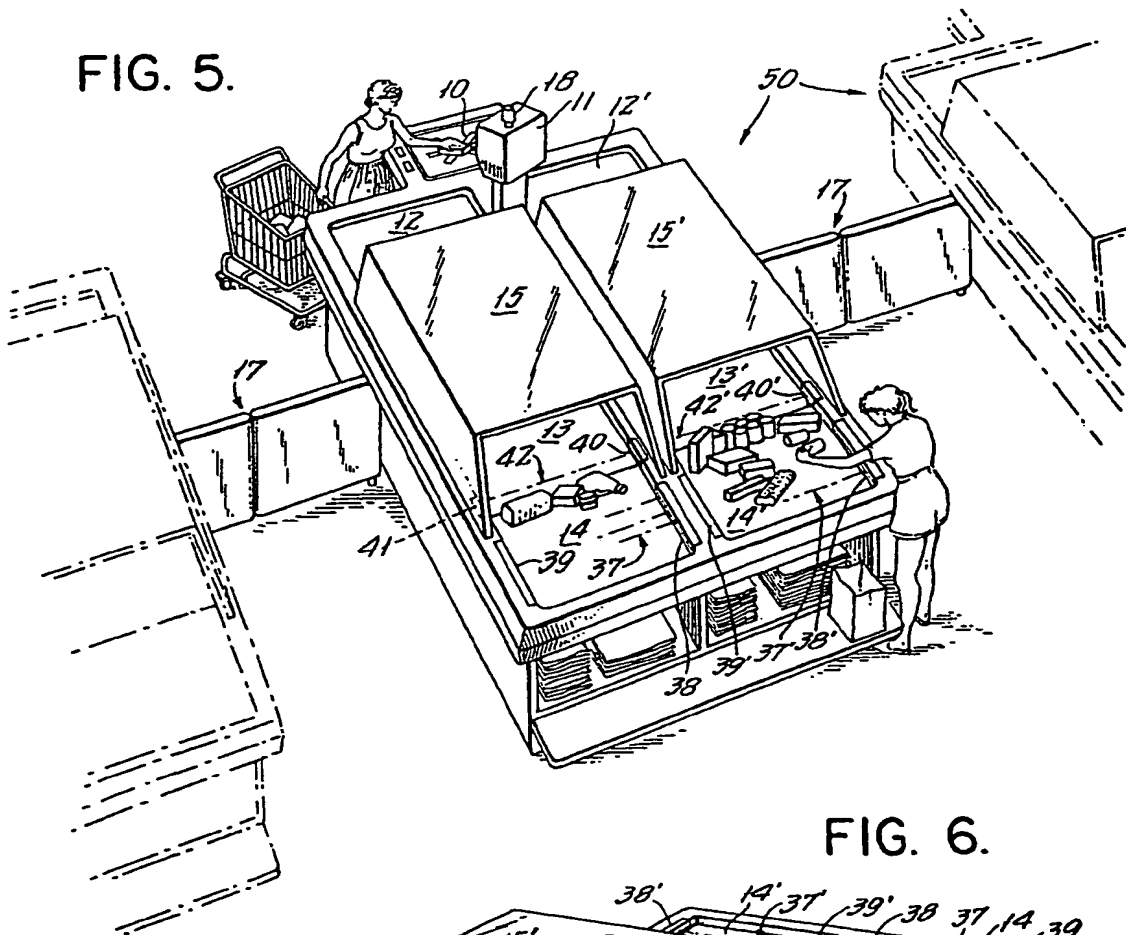
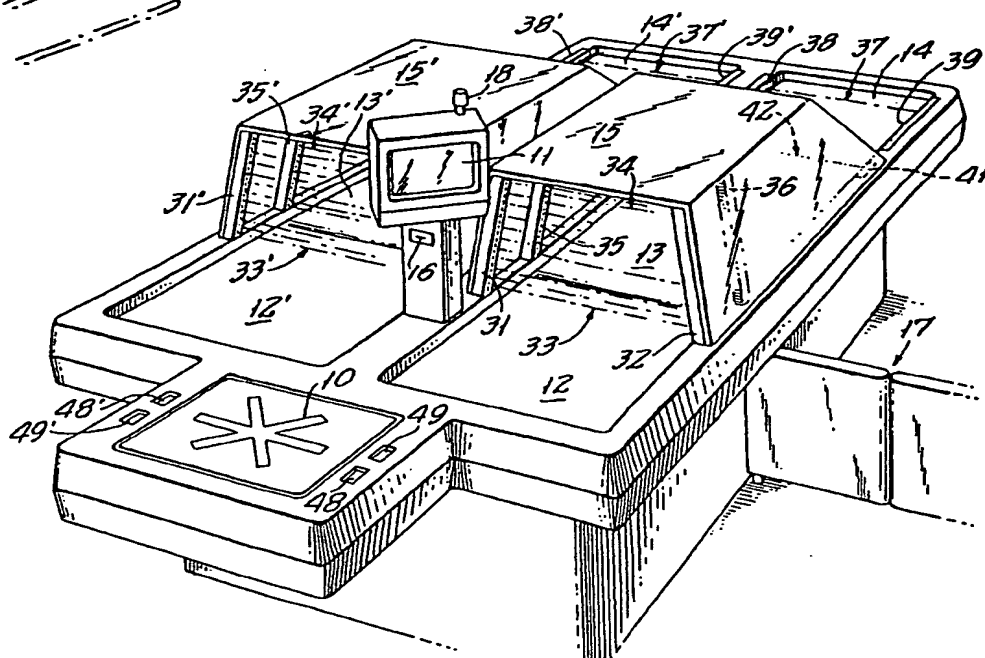


FIG. 6.



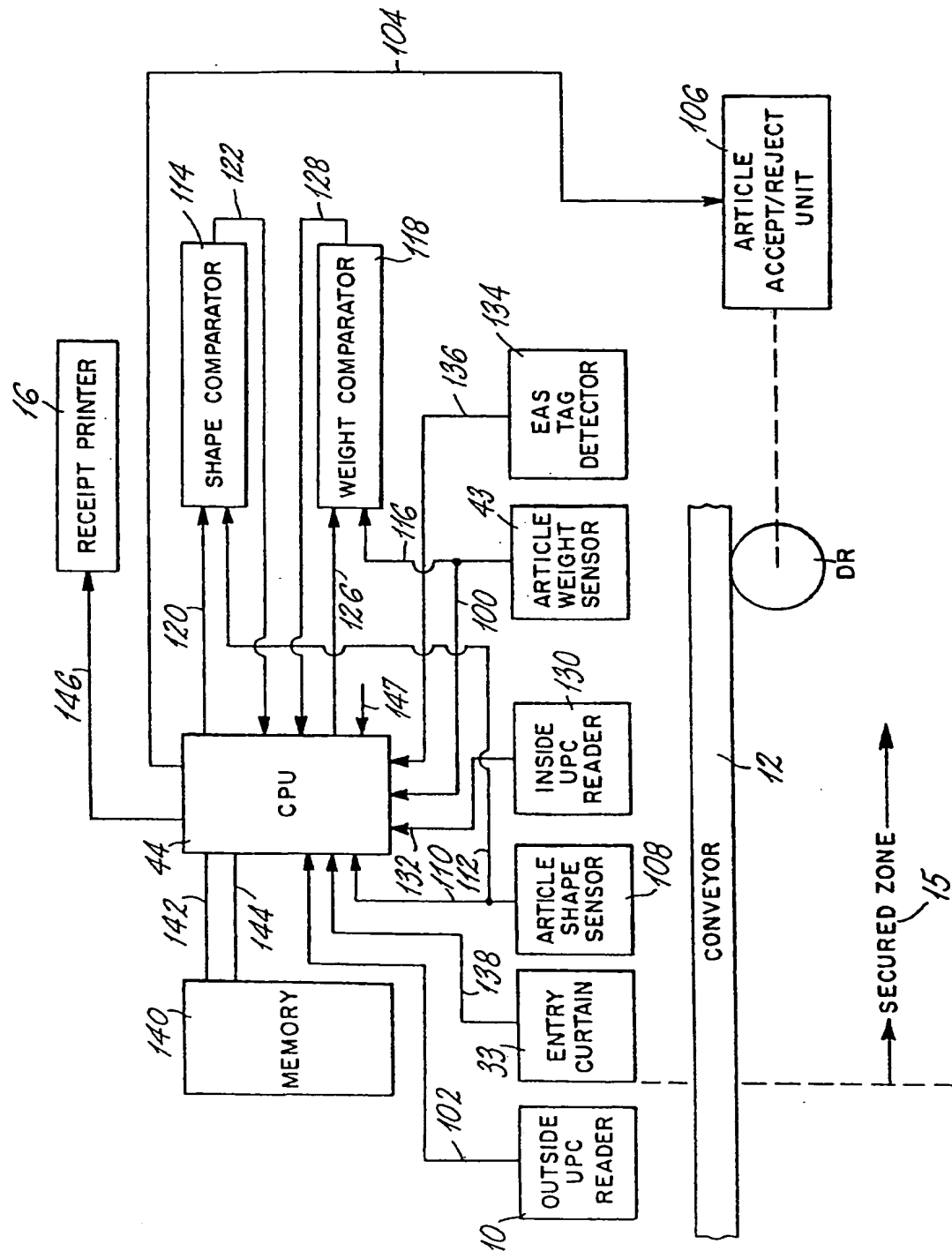


FIG. 7

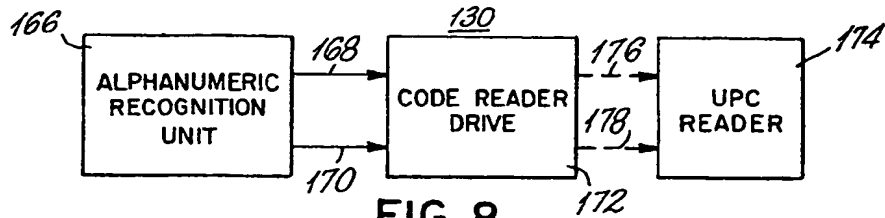


FIG. 8

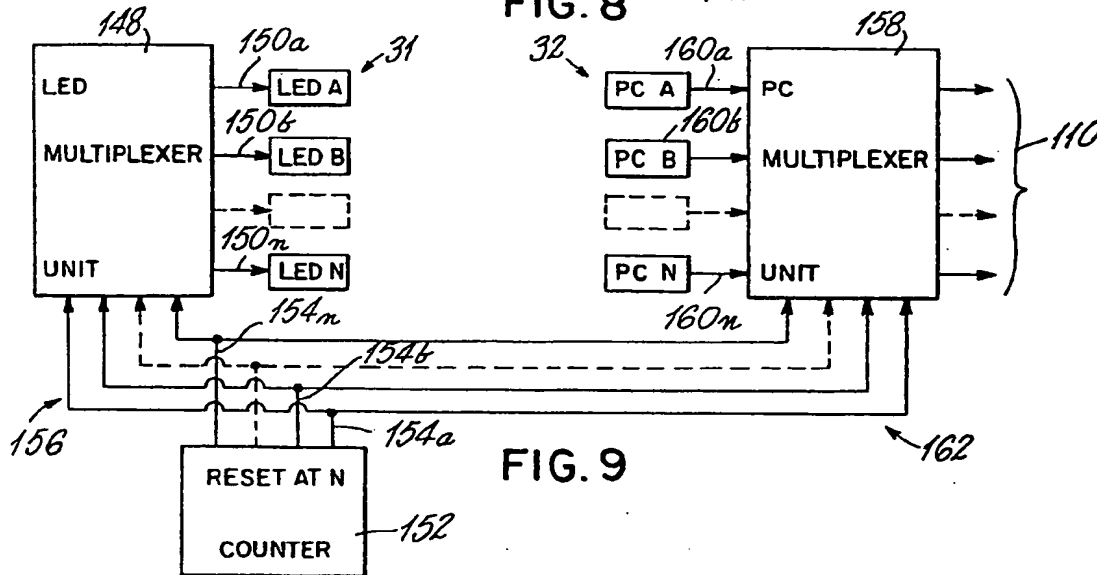


FIG. 9

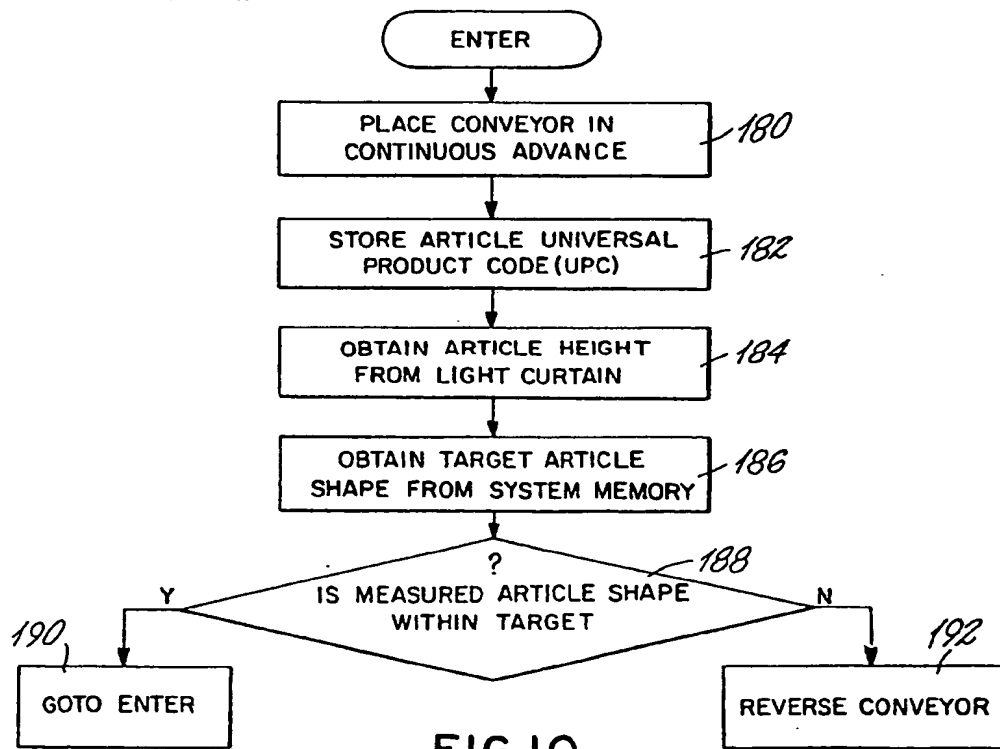


FIG. 10

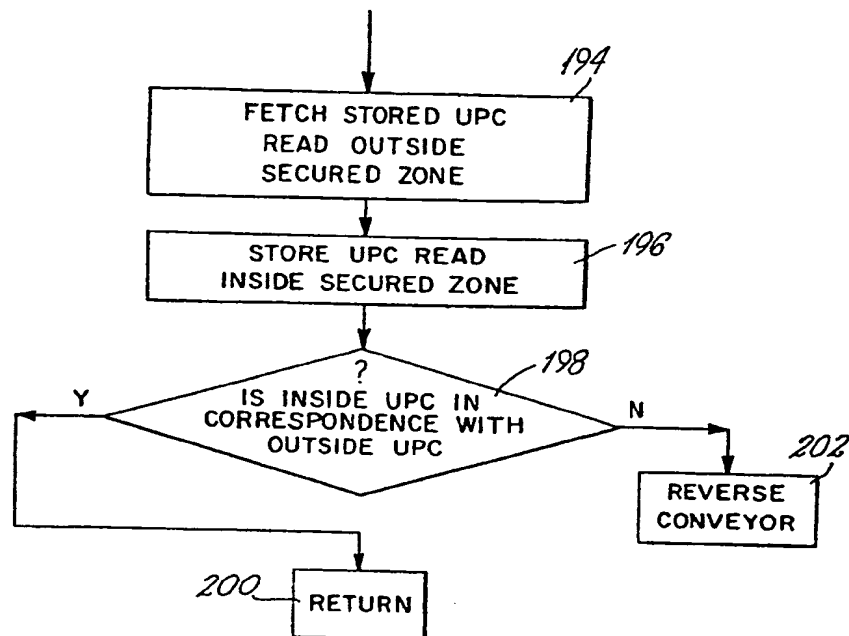


FIG. 11

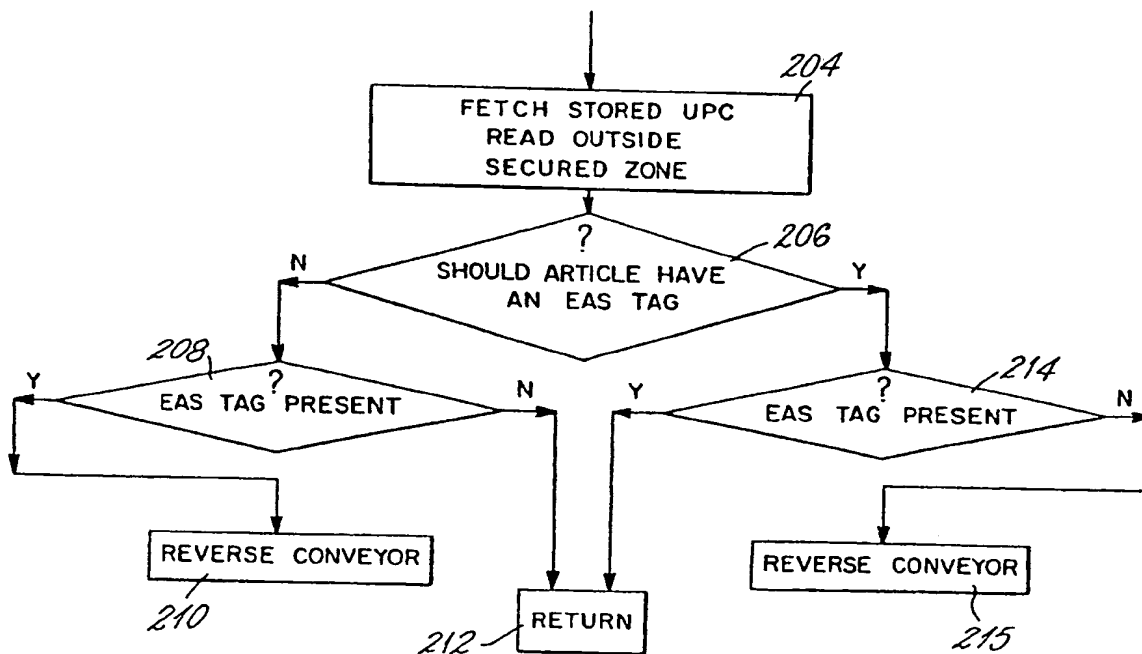


FIG. 12

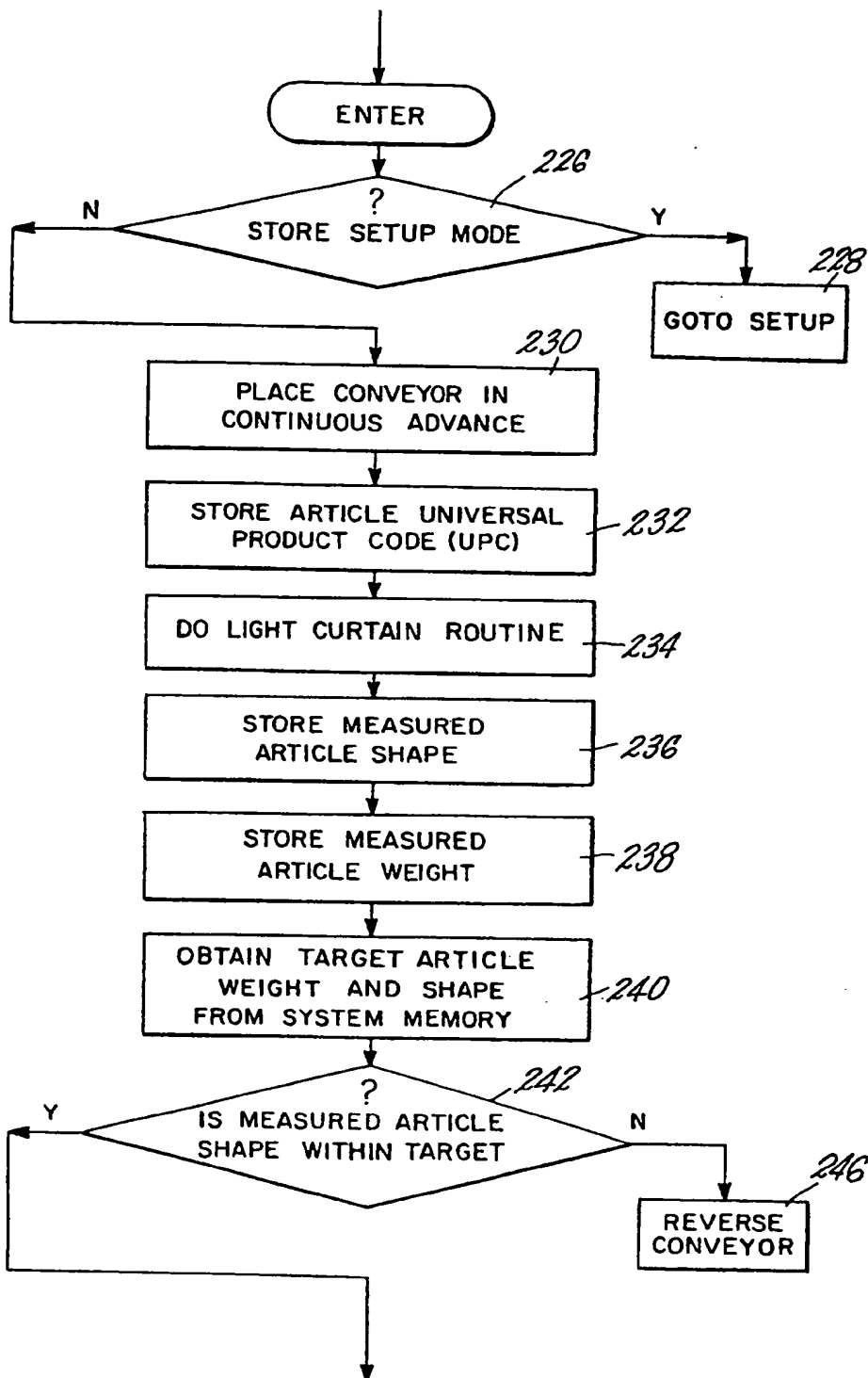
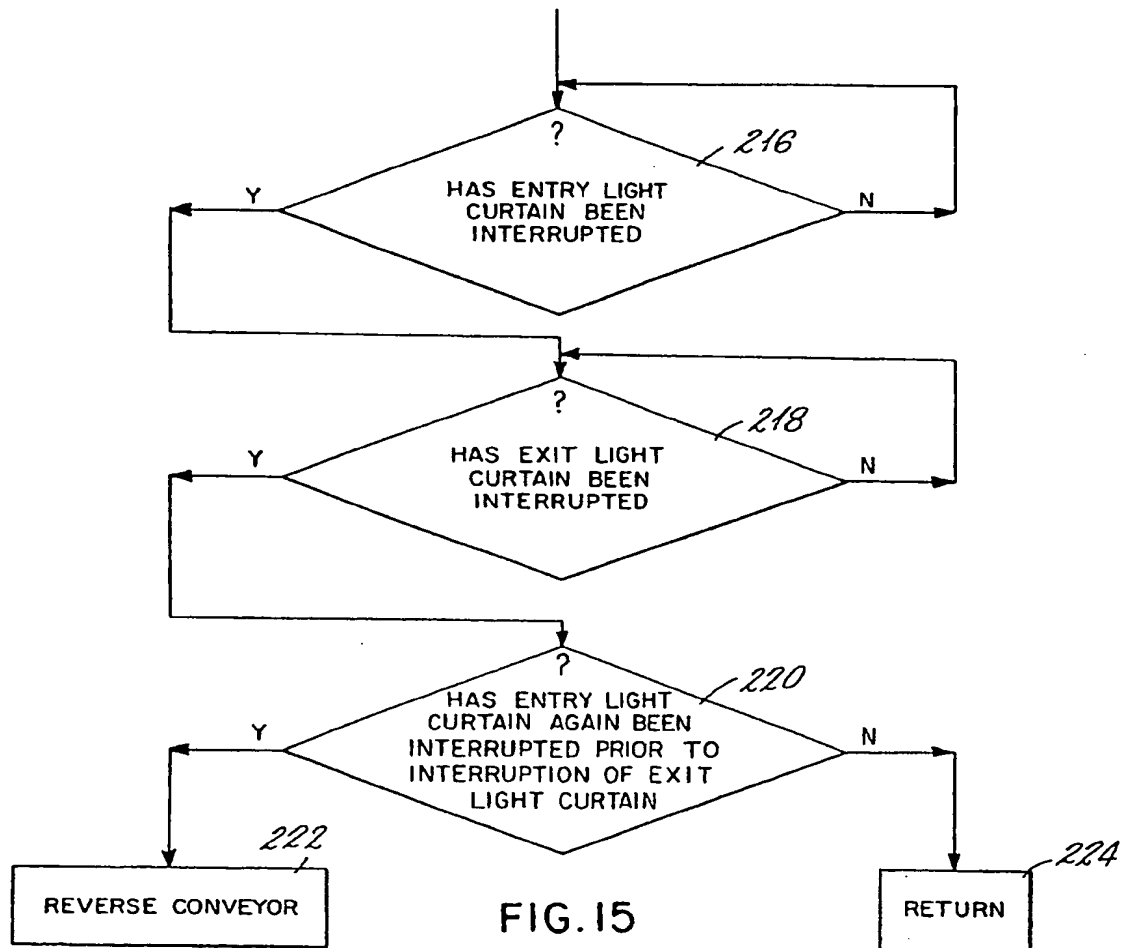
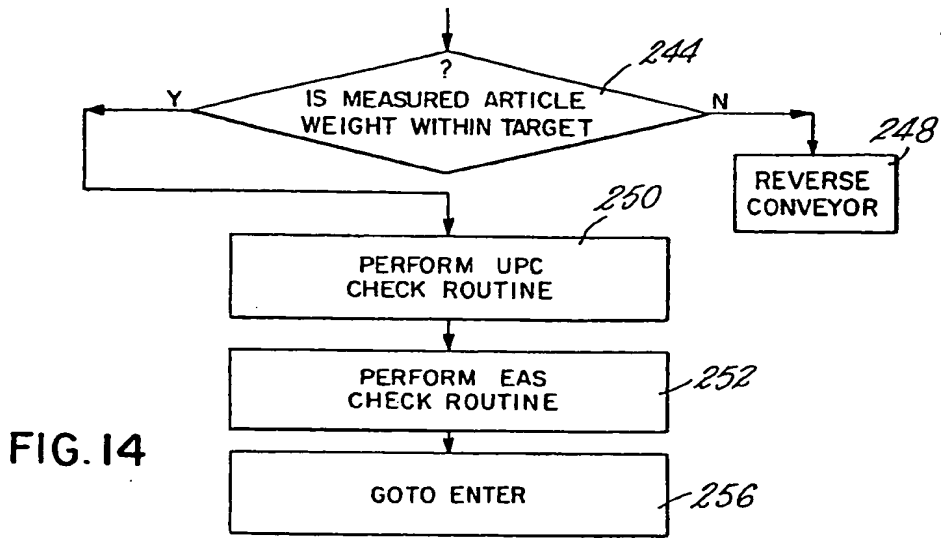


FIG. 13



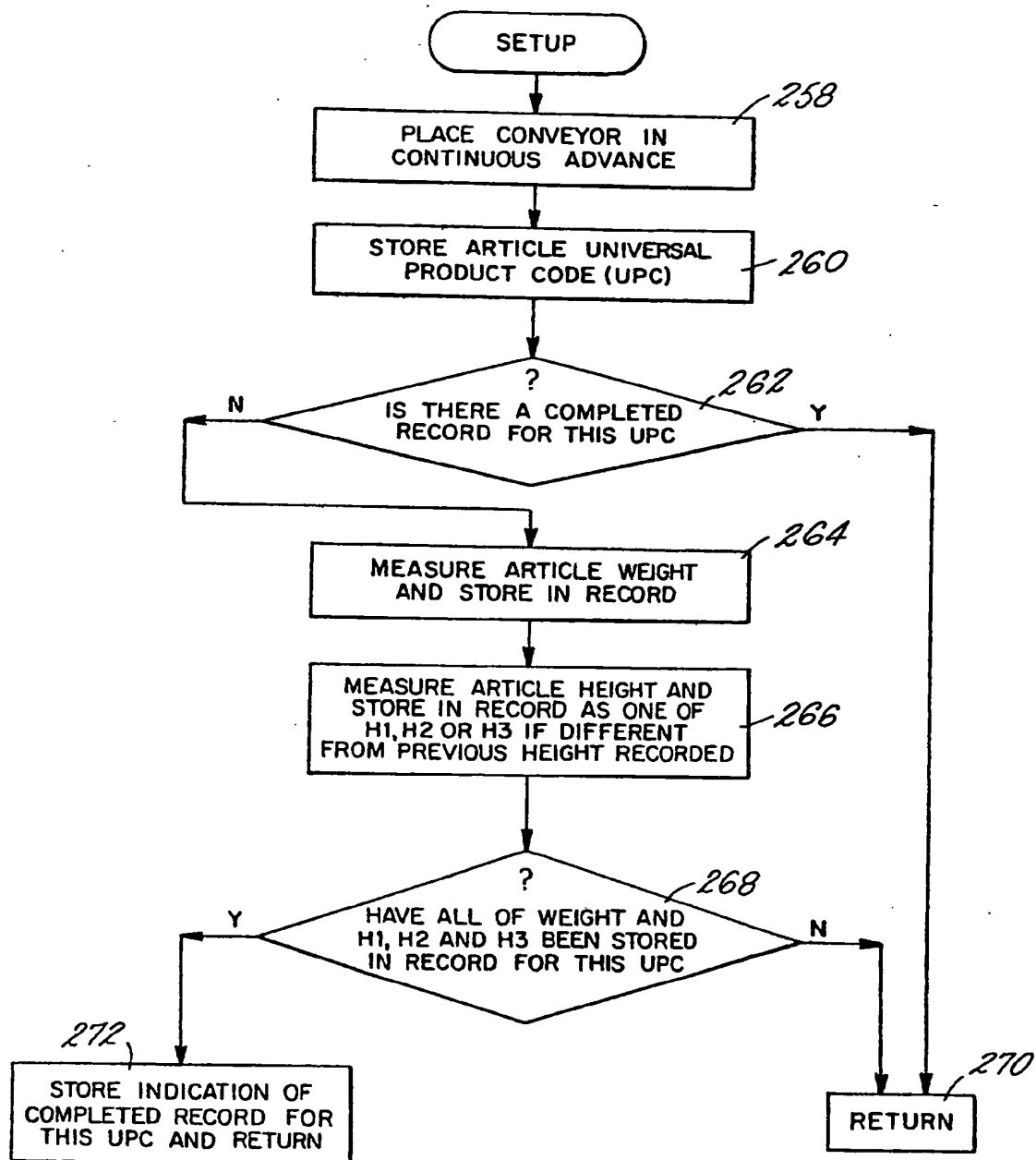


FIG. 16

SPECIFICATION

System for security processing of retail articles

- 5 The present invention relates generally to security systems and methods for processing retail articles and pertains more particularly to systems and methods for safeguarding operator-unattended checkout of purchased articles in supermarkets and the like facilities against customer fraud. 5
- One type of prior art system for operator-unattended supermarket checkout of articles is shown in Otis U.S. Patent No. 2,919,851, which issued on January 5, 1960. In an aspect of the Otis system intended to provide some safeguard against customer fraud, a distinct machine-discernible code is assigned to each article as is a machine-discernible indication of the weight of such article within a given tolerance range. The code and weight indication are discerned for articles selected for purchase and the weights thereof are totalized with tolerance. The customer is required to place the shopping bag containing all selected articles in a restricted area which has a weight scale providing electrical signal output of the measure weight. If the measured weight signal corresponds with the totalized weight derived from the code and machine-discernible weight indication, the Otis system does not reject the transaction. However, where there is not the required correspondence, the Otis system directs the customer to consult the store manager, who then inspects the details of the transaction. A further facet of the Otis system is to provide machine-discernible price indication for each article and to provide a printed record of the details of the transaction with price totalization. 10
- A second type of prior art system is seen in both Abt U.S. Patent No. 3,681,570 and Strohschneider U.S. Patent No. 3,681,571, both of which are assigned in common to Zellweger Ltd. and issued on August 1, 1972. Such '570/571 system is generally of the Otis type, i.e., accepting or rejecting a transaction on the basis of a comparison of a measured article characteristic with a preassigned value therefor, correlated with article identification code. Articles are examined in the '570/571 system on a per article basis and accepted articles are conveyor-transported to a secured container, which is inaccessible to the customer until after payment, i.e., there is no human intervention, such as the bagging of individual accepted articles, until all selected articles are found acceptable and paid for. Articles which are rejected in the '570/571 system are transported to a second (rejection) conveyor and returned to the customer. 15
- It is an object of the present invention to provide improved system and method for operator-unattended retailing of consumer articles. 20
- Another object of the invention is to provide plural bases for the rejection of articles fraudulently sought by customers in such operator-unattended retail facilities. 25
- A further object of the invention is to provide improved system and method for implementing a store of information useful in the operation of an operator-unattended article merchandising facility. 30
- According to the present invention there is provided a system for processing articles selected for purchase and bearing distinct identification codes, said system including:
- (a) code reader means for generating an output signal indicative of such article identification code; 35
 - (b) conveyor means for receipt and transport of such article; 40
 - (c) sentry means for defining an inlet to a security zone extending along a portion of said conveyor means; 45
 - (d) sensor means for sensing a measurable characteristic of such article and generating an output signal indicative of such article characteristic; and 50
 - (e) control means for selective movement of said conveyor means in respective article acceptance and article rejection senses, and control means being operable. 55
- I. for storage, for each of a plurality of such articles, of a signal indicative of a predetermined value of said article characteristic correlated with such article identification code,
 - II. for response to said code reader means output signal for comparison of such stored signal with said output of said sensor means, and 60
 - III. for operation of said conveyor means selectively in response to the results of such comparison. 65
- In a system first version, the sentry means may comprise a light curtain which provides an output signal indicative of the article shape in addition to generating the entry-indicative signal. The control means for storage will, in this instance, include a compilation of article shape correlated with article UPC. 60
- The system first version may further include an additional code reader in the secured zone for generating an output signal indicative of such code, the control means being operative for further comparing the output signal of the first-mentioned code reader with the output signal of the additional code reader and operating the conveyor means selectively in response to such 65

further comparison.

A further variant of the system first version would include therein an EAS detection unit for determining whether or not an article in the security zone is EAS-tagged, the control means being operative for storing indication, for each of a plurality of such articles, of whether or not
5 such article should be EAS-tagged and operating the conveyor means selectively in response to such stored indication and determination. 5

In still another variation of the system first version, the control means is itself operative for compiling a store, for each of a plurality of such articles, of a signal indicative of a predetermined value of the article characteristic correlated with article identification code, by
10 processing of the output signals of the code reader and the sentry means. 10

In a system second version, one can omit the article shape comparison measure of the system first version and substitute usage of the variation first mentioned above, i.e. the additional code reader and comparison of codes read outside and within the secured zone.

In a system third version, one can substitute, for the article shape comparison of the system
15 first version, usage of the EAS detection unit and associated measures above discussed therewith. 15

Weight measuring and comparison measures may be used with any of the system versions.

A system fourth version would comprise article characteristic measurement and comparison with predetermined article characteristic values stored by operation of the control means itself,
20 by processing of the output signals of an article characteristic sensor and the code reader. 20

A composite system version may include all of the foregoing aspects of the several above system versions.

The present invention will now be described in greater detail by way of examples with reference to the accompanying drawings, wherein like reference numerals identify like parts and
25 components throughout, and wherein: 25

Figure 1 is a perspective view of a typical checkout area of a supermarket in accordance with the invention, as seen from the point of customer egress.

Figure 2 is a perspective view of one of the checkout stations or counters as used in the embodiment of Fig. 1 as seen from the point of customer entry.

Figure 3 is a front perspective view of the cashier station forming a part of the embodiment
30 illustrated in Fig. 1. 30

Figure 4 is a schematic illustration of the system components in the form of a combined flow chart and block diagram of the embodiment of Fig. 1.

Figure 5 is a perspective view similar to that of Fig. 1 but showing a modification of the
35 invention wherein dual pathways are associated with a single check-out unit. 35

Figure 6 is a perspective view of one of the counters of the embodiment of Fig. 5 as seen from the entry end thereof.

Figure 7 is a system block diagram of components interconnected to provide a composite system in accordance with the invention.

Figure 8 is a block diagram of an entry light curtain subsystem in accordance with the
40 invention. 40

Figure 9 is a block diagram of a mobile UPC reader usable in practicing the invention.

Figure 10 to 16 are flowcharts of practices in various versions of systems of the invention.

Referring to Fig. 1, a checkout area in a supermarket includes counters and intervening
45 passageways. Each counter 20 has a laser UPC reader 10, a display screen 11 for interactive customer communication, an infeed or entry conveyor 12, an outfeed or exit conveyor 13, a bagging area 14, a tunnel or secured zone 15, a receipt unit 16 (Fig. 2), passageway control gate 17 and an assistance signal lamp 18. 45

For each group of checkout counters, there may be a single cashier 21, who is furnished with
50 a master monitor screen 22, a keyboard 23 with cash drawer 24, a final sales slip printer 25, 50 and a customer viewable display 26 (Fig. 3).

In using a checkout counter 20, a customer approaches same with items selected for purchase, usually transported to this point in a conventional shopping cart. If the counter is available for use, the display screen 11 will carry messages such as listed in Table I below.
55 55

Table I

Hello. This is a touch-activated display. Simply touch the screen to the right of the desired message to make your selection.

1. I'm ready to begin scanning. (touch)
- 60 2. I need to review the operating instructions before beginning. (touch) 60
3. Help! I would like assistance. (touch)

As is stated in the introductory message, the display screen 11 is touch sensitive or touch activated by touching with a human finger at any one of a number of predetermined locations.

For the particular example, there would be three such locations. Applying a finger to one of the
65 locations is equivalent to operating a switch or pressing a signal button, or the like, and 65

communicates to the system the affirmative response to the associated inquiry displayed on screen 11. For this initial discussion of system usage, it will be assumed that the customer is experienced and will touch the location adjacent Message 1. in Table I.

The customer now passes each item, one by one, UPC code down, over reader 10 and
5 deposits the item on entry conveyor 12. The prices and item identifications may appear now on display screen 11 as the items are transported by the conveyors through secured zone 15 out of reach of the customers to bagging area 14. 5

When all of the items have been scanned by reader 10 and placed on entry conveyor 12, the customer may again communicate with a different display on screen 11 to initiate presentation
10 to the customer of a printed receipt from receipt unit 16. The customer now takes the receipt and the shopping cart and proceeds through the control gates 17 to the bagging area 14 to bag the items, place the loaded bags in the shopping cart, and then proceeds to cashier 21. Each counter will have a separate identifier, a number, a letter, a combination, or the like, by which it can be identified to the cashier. Such identifier will appear on the printed receipt proffered to
15 the cashier, and it will also appear on the master monitor screen 22 along with the subtotal corresponding to that printed by the receipt unit 16 and stored by the system. 15

Through the keyboard 23, the cashier can enter credit for any proffered coupons and can add any items that could not be handled automatically by the counter 20, such as oversized items or items without UPC labelling. As the cashier makes entries via keyboard 23, a visual confirmation is provided to the customer by display 26. A final receipt is printed and furnished by printer
20 25, and the payment transaction is accomplished in conventional manner. 20

For a self-service, operator-unattended system to be effective, it need include various safeguards to accommodate inadvertent customer mistakes and to insure against attempts either to bypass the system or defraud. Various such measures are included in systems of the
25 invention, now discussed. 25

Referring to Figs. 1, 2 and 4, each counter 20 has an entrance sentry 33 in the form of an electronic curtain at the entry to its secured zone 15. The curtain is established by an array 31 of LED (light-emitting diode) elements or other light sources mounted along one side of secured zone 15 and cooperating with a corresponding array 32 of photocells, photosensitive diodes, or
30 the like, mounted along the opposite side of secured zone 15. 30

An exit sentry 34 in the form of a second electronic curtain consisting of an LED array 35 and a photocell or photosensitive diode array 36 is located at the junction between entry conveyor 12 and exit conveyor 13, mounted within the secured zone similarly to sentry 33. While the curtains of sentries 33 and 34 are vertically oriented in the secured zone, a further curtain 37
35 may be horizontally disposed within bagging area 14 with its LED array 38 located on one side and its photosensitive diode array 39 located on the opposite side. Further, a photobeam assembly comprising a light source 40 and a detector 41 may be provided as a detecting beam
42 located at the intersection between the exit conveyor 13 and bagging area 14. 35

Referring to Fig. 4, the various components of the system of Fig. 1 are shown schematically. Under each entry conveyor 12 there is provided a sensitive weigh scale 43 that responds to any
40 change in the weight of the conveyor that is caused by articles being placed thereon or removed therefrom. The weigh scale 43 can be of conventional construction capable of producing an analog electronic output signal which is fed to a processor 44 which processor is tied in over a suitable circuit (not shown) to a central computer for the market which will contain in its
45 memory the entire store inventory by product identification, weight and price. Another link (not shown) couples the processor 44 to the cashier's master monitor 22 and keyboard 23 for furnishing thereto the subtotal information previously mentioned. The central computer for the market can be similar to those now in use in connection with current check-out clerk-cashier
operated laser-cash register-scale assemblies. 45

As further illustrated in Fig. 4, the laser 10 is connected electrically to the processor 44 which
50 is connected to and controls the conveyors 12 and 13, both of which are arranged for both forward and reverse operation. Similarly, each of the electronic screens or beam sensors 33, 34, 37 and 42 is connected to processor 44. An optional surveillance system 45 is connected to the gate 17 through which the customer passes en route to the cash register 46 and then the exit.
55 The cash register 46 includes the components 23 to 26 as shown in Fig. 3. 55

The surveillance system 45, if used, can be constructed as disclosed in Humble et al. United States Patent No. 4,394,645 for "Electrical Surveillance Apparatus with Moveable Antenna Elements" issued July 19, 1983 and assigned to the same assignee as the present application. As described in said Humble et al. patent suitable antenna coils are concealed within the
60 swinging gates, here the gates 17, and responds to magnetically permeable tags affixed to the various articles. The system is not responsive to tags passed around the gates through the tunnels 15, but will sound an alarm or activate an indicator if any article bearing such tag is carried through the gates either in the shopping cart or on the person of the customer. Naturally, a suitable sensitive element must be affixed to each article in the market that it is
65 desired to maintain under surveillance. 65

If for some reason as a customer is scanning items with the laser and depositing them on the conveyor 12 a faulty reading is obtained or the apparatus through its weigh scale detects a discrepancy, the conveyor 12 will stop operating and the messages shown in Fig. 10 will appear on display screen 11. The customer will either comply with the instructions or, if assistance is required, will touch location 47 on the screen to illuminate the signal lamp 18 for alerting an appropriate assistant.

The laser 10 has associated with its operation a pair of signal lights 48 and 49, one of which, for example 48, may be green while the other, 49, is red. As mentioned above, when the customer approaches an available counter 20, he or she is greeted with the messages of Fig. 7 on the display screen 11. After touching location 27 on the screen, the customer will begin scanning articles over the laser 10. If the scan is accomplished properly, that is, if the laser has performed a reading of the UPC label, the green light 48 is illuminated to advise the customer that the article may be placed on conveyor 12. If there is some fault in the scan, the red light 49 will be illuminated. Of course, the signal lights 48 and 49 on the counter could be replaced by appropriate signals on the display screen 11 or associated therewith.

Upon a satisfactory scan of an article, the description thereof and its price is displayed on the screen 11 in the format of Table II.

Table II

Item	Price
Mamat Rice	.55
Garl Dress	.41
Green Bean	.34
Ken-L-Ratn	6.95
10 lb. Ham	11.75
Subtotal	\$20.00

If you have finished scanning your groceries (touch), if not, continue scanning.

At the same time the processor 44 receives information from the central computer (not shown) concerning the normal weight of the article just scanned. This weight is compared with that determined by the weigh scale 43 and if there is proper correlation the conveyors 12 and 13 will convey the article to the bagging area 14. If there is a discrepancy the system will return the article to the customer for repeating the scanning operation.

As each item is being scanned and processed the customer's receipt is being printed. Any deviation from the processing routine, intentional or by accident, will cause the system to stop and inform the customer that a mistake has been made and the article should be rescanned. Upon completion of article scanning, the customer touches the location indicated on the Table II display, which action causes the subtotal to be printed on the receipt and the receipt to be delivered by unit 16 to the customer. The customer then proceeds to the cashier 21 as previously described, the receipt from unit 16 providing means for use in establishing, along with the final receipt from the cashier, that the customer is entitled to remove the presented articles from the market, i.e., from the distribution area.

Any convenient number of check-out counters 20, alternatively referred to as check-out stations, can be coupled to a single cash register 46 as shown schematically in Fig. 4.

With the embodiment shown in Figs. 1 and 2, the laser 10 and display screen 11 of a given counter 20 are rendered inactive and unavailable to a succeeding customer so long as the bagging area 14 of that counter is occupied by articles belonging to a preceding customer. This arrangement, therefore, is not capable of making maximum use of the expensive laser units and display screens. However, considerable increase in efficiency is available through use of the modified structure shown in Figs. 5 and 6. Here, two sets of conveyors, tunnel and bagging area are served by a single laser and display screen. Where identical components appear in Figs. 5 and 6 as are included in Figs. 1 and 2, they are designated by the same reference numeral, or, to designate the duplicate, by the reference numeral primed. For convenience, the dual or duplex counter is designated generally by the reference numeral 50. While not specifically illustrated, it should be understood that a separate weigh scale 43 is located under each of the conveyors 12 and 12' in Figs. 5 and 6. A single processor 44, however, can service both conveyor lines and the common laser and screen.

As illustrated in Fig. 5, the customer will scan items while standing to one side or the other of the laser 10. For this reason, it may be desirable to duplicate lights 48 and 49 as 48' and 49' in the manner best seen in Fig. 6. Also, the display screen 11 is preferably pivotably mounted to permit rotation by the customer so that the screen and customer are directly facing one

another.

There is one further departure found in the embodiment of Figs. 5 and 6. Here, as illustrated in Fig. 5, one customer can be bagging articles from, for example, bagging area 14' while a second customer is using the common laser 10, but feeding articles to the alternate conveyor line consisting of conveyors 12 and 13. In order to direct the customer, an additional message is incorporated in the initial display for screen 11, which message directs the customer to use the available counterside. This directive is included only as a convenient courtesy since conveyor 12' will be kept inoperative and conveyor 12 will start up when the first article is screened if bagging area 14' is to be protected from commingling by items from a following customer. Of course, when bagging area 14 is occupied the operation is transferred to the conveyor 12' while conveyor 12 is kept inoperative.

For a more detailed understanding of the operation of the system reference should be had to the "STATUS TABLE" that follows. For the purpose of reading the table, the first curtain is either the curtain 33 or 33', while the second curtain is either the curtain 34 or 34'. Each state appears on a different line designated by one or two letters of the alphabet. The description of the state is only presented in abbreviate form and will be understood only when read as part of a progression through the states of the apparatus.

Line "A" represents the initial state. Both conveyors 12 and 13 are off or stationary. The scanner 10 is enabled ready to read the UPC label of any item passed thereover. The weigh scale 43 is disabled, and the initial display of Table I is on the screen 11.

STATE TABLE

RESULTANT STATE	INPUT CONDITIONS									
	Scan	First Curtain		Second Curtain		Weight		Excess Time	Touch Input	Item Printed
		Break	Restore	Break	Restore	Valid	Invalid			
A. INITIAL STATE... Conveyors off, scanner enabled, scale disabled, display "HELLO:" (Fig. 7)	B	C								
B. 1 ITEM SCANNED... Conveyors fwd., scanner disabled, scale enabled, set 5 sec. time		D				E	C	C		
C. ILLEGAL OPERATION... Entry rev., outfeed no change, scanner disabled, scale disabled, remove item, set 5 sec. time, display "REMOVE" (Fig. 10)			FF					F		
D. 1 ITEM, BREAK 1st CURTAIN, NO WEIGHT... Entry fwd., outfeed fwd., scanner disabled, scale enabled			I	C		H	C			
E. 1 ITEM, WEIGHT VALID... Entry fwd., outfeed fwd., scanner enabled, scale enabled	J	H					C			
F. ASSUME ITEM REMOVED... Entry stop, outfeed fwd., scanner enabled, scale disabled, set 5 sec. time, display "REMOVE" (Fig. 10)	B	C						IF ITEM PRINTED THEN G, ELSE A		
G. COMPLETION QUERY... Entry stop, outfeed fwd., scanner enabled, scale disabled, display "FINISHED?" (Fig. 8)	B	C							EE	

(STATE TABLE continued)

	Scan	First Curtain		Second Curtain		Weight		Excess Time	Touch Input	Item Printed
		Break	Restore	Break	Restore	Valid	Invalid			
H. 1 ITEM, IN 1st CURTAIN, WEIGHT VALID... Entry fwd., outfeed fwd., scanner enabled, scale enabled	K		L	JJ			C			
I. 1 ITEM, BEYOND 1st CURTAIN, NO WEIGHT... Entry fwd., outfeed fwd., scanner disabled, scale enabled		C		C		L	C			
J. 2 ITEMS, BEFORE 1st CURTAIN, NO WEIGHT... Entry fwd., outfeed fwd., scanner disabled, scale enabled		K		GG		M	C			
K. 2 ITEMS, 1 IN 1st CURTAIN, NO WEIGHT... Entry fwd., outfeed fwd., scanner disabled, scale enabled			N	C		O	C			
L. 1 ITEM, BEYOND 1st CURTAIN, WEIGHT VALID ... Entry fwd., outfeed fwd., scanner enabled, scale enabled	N	C		P			C			
M. 2 ITEMS, BEFORE 1st CURTAIN, WEIGHT VALID ... Entry fwd., outfeed fwd., scanner disabled, scale enabled		O					C			
N. 2 ITEMS, 1 BEYOND 1st CURTAIN, NO WEIGHT ... Entry fwd., outfeed fwd., scanner disabled, scale enabled		Q		GG		R	C			
O. 2 ITEMS, 1 IN 1st CURTAIN, WEIGHT VALID ... Entry fwd., outfeed fwd., scanner disabled, scale enabled			R	KK			C			

(STATE TABLE continued)

	Scan	First Curtain		Second Curtain		Weight		Excess Time	Touch Input	Item Printed
		Break	Restore	Break	Restore	Valid	Invalid			
P. 1 ITEMS, WEIGHT VALID, IN 2nd CURTAIN... Entry fwd., outfeed fwd., scanner disabled, scale disabled		S			DD		S			
Q. 2 ITEMS, 1 IN AND 1 BEYOND 1st CURTAIN, NO WEIGHT... Entry fwd., outfeed fwd., scanner disabled, scale enabled			T	C		U	C			
R. 2 ITEMS, 1 BEFORE AND 1 BEYOND 1st CURTAIN, WEIGHT VALID... Entry fwd., outfeed fwd., scanner disabled, scale enabled		U		V			C			
S. PASS ITEM IN 2nd CURTAIN, WEIGHT INVALID OR 1st CURTAIN BROKEN... Entry fwd., outfeed fwd., scanner disabled, scale disabled					N					
T. 2 ITEMS, BOTH BEYOND 1st CURTAIN, NO WEIGHT... Entry fwd., outfeed fwd., scanner disabled, scale enabled		C		C		X	C			
U. 2 ITEMS, 1 IN AND 1 BEYOND 1st Curtain, WEIGHT VALID... Entry fwd., outfeed fwd., scanner disabled, scale enabled			X	Y			C			
V. 2 ITEMS, 1 BEFORE 1st AND 1 IN 2nd CURTAIN, WEIGHT VALID... Entry fwd., outfeed fwd., scanner disabled, scale enabled		Y			Z		S			

(STATE TABLE continued)

	Scan	First Curtain		Second Curtain		Weight		Excess Time	Touch Input	Item Printed
		Break	Restore	Break	Restore	Valid	Invalid			
CC. 1 ITEM BEYOND EACH CURTAIN, NO WEIGHT... Entry fwd., outfeed fwd., scanner disabled, scale enabled, print item										I
DD. 1 ITEM BEYOND 2nd CURTAIN... Entry stop, outfeed fwd., scanner enabled, scale disabled, print item, set 5 sec. time	B	C						G		
EE. THANK YOU... Entry stop, outfeed fwd., scanner disabled, scale disabled, print subtotal, set 15 sec. time, display "THANK YOU" (Fig. 9)		C						A		
FF. 1st CURTAIN RESTORED AFTER ILLEGAL 1st CURTAIN BREAK... Entry rev., outfeed no change, scanner disabled, scale disabled, set 3 sec. time, display "REMOVE" (Fig. 10)		C		GG				IF ITEM PRINTED THEN G, ELSE A		
GG. ILLEGAL 2nd CURTAIN BREAK... Entry rev., outfeed rev., scanner disabled, scale disabled, display "REMOVE" (Fig. 10)					HH					
HH. 2nd CURTAIN RESTORED AFTER ILLEGAL BREAK... Entry rev., outfeed rev., scanner disabled, scale disabled, set 2 sec. time, remove items, display "REMOVE" (Fig. 10)		C		II				IF ITEM PRINTED THEN G, ELSE A		

(STATE TABLE CONTINUED)

	Scan	First Curtain		Second Curtain		Weight		Excess Time	Touch Input	Item Printed
		Break	Restore	Break	Restore	Valid	Invalid			
II. SUCCESSIVE 2nd CURTAIN BREAK... Entry rev., outfeed rev., scanner disabled, scale disabled, display "REMOVE" (Fig. 10)					FF					
JJ. 1 ITEM, BOTH CURTAINS BROKEN, WEIGHT VALID... Entry fwd., outfeed fwd., scanner disabled, scale enabled			P		HH		C			
KK. 2 ITEMS, BOTH CURTAINS BROKEN, WEIGHT VALID... Entry fwd., outfeed fwd., scanner disabled, scale enabled			V		HH		C			

Various actions, either by the apparatus or by the customer, are listed under "INPUT CONDITIONS". Only those in which a letter appears in the corresponding box below the heading are valid inputs for the state on that line. Thus, for the initial state either a scan can occur or an illegal break or interruption in curtain 33 can take place. Such a curtain break might occur if the customer tried to place something downstream on the conveyors without scanning the UPC label. Hence, on line "A" under "First Curtain Break" appears the letter "C" indicating a change to the state on line "C" which state is identified as "Illegal Operation". Following through an initial illegal operation it will be observed that an illegal operation state is accompanied by reverse operation of the entry conveyor 12. This is abbreviated as "Entry rev." in the state table. Simultaneously, the operation of the outfeed conveyor 13 will remain unchanged. In this situation, since it never commenced operation, it will be stationary. The scanner 10 is disabled, the weigh scale 43 is disabled, and the screen 11 will display the remove item message of Table III.

15 Table III

Please remove the last item from the conveyor belt.
It has not been scanned and/or registered properly and must be scanned again.
Also, the timing of a 5 second time interval will commence. If no action takes place within 5 seconds, the system sequences to the state on line "F" in which conveyor 12 is halted, signified by "Entry stop", conveyor 13 operates in the forward direction ("outfeed fwd."), the scanner 10 is enabled while the scale 43 is disabled, the Fig. 10 display remains on screen 11, and another 5 second interval is timed. If nothing happens within the next 5 seconds, since this was an initial state change before any items had been processed or printed, the system will revert to state "A", the initial state.

Using the principles implicitly in the procedure just described, it is possible to track through the state table any sequence of events. For the purpose of further explanation, a series of legitimate operations will be considered.

Assume a customer approaches, as before, while the system is in state "A", and scans the first item which is then placed on the conveyor 12. In Fig. 4, this operation is represented by movement of the item through position "A" to position "B" on conveyor 12 in front of curtain 33. The state table indicates, line "B", that 1 item has been scanned, both conveyors are moving forward, the scanner is now disabled but the scale is enabled, and a 5 second interval is set to be timed out. If the weight is not validated or the curtain 33 interrupted within 5 seconds, it is treated as an illegal operation, as mentioned above. But assume movement of the item from position "B" to position "C" on conveyor 12 (see Fig. 4) causing interruption of curtain 33. The system sequences to state "D". The conveyors are moving forward, the scanner is disabled and the scale is enabled. With valid operation, the next event should either be movement of the article to position "D" to restore curtain 33 or a determination of a valid weight. If curtain 33 is restored first, the system progresses to state "I" with both conveyors 12 and 13 operating in the forward direction, the scanner disabled and the scale enabled.

Verification of proper weight at this point causes the system to step to state "L". Both conveyors 12 and 13 operate in forward direction, and now the scanner is enabled. When the article reaches position "E" it crosses from conveyor 12 to conveyor 13 and interrupts curtain 34 causing a change to state "P". At this juncture the conveyors 12 and 13 are moving forward, and both the laser 10 and scale 43 are disabled.

The next valid operation will be a restoration of curtain 34 when the article has advanced onto conveyor 13 as represented by position "F". As intended with all the position indications, the location of the phantom lined box in Fig. 4 is significant only insofar as it indicates a position before, in or after a given curtain. Now with curtain 34 restored, the sequence advances to state "DD", during which printing on the receipt takes place. This is accompanied by a 5 second interval. If another article is not scanned during this interval, progress shifts to state "G" in which the outfeed conveyor 13 continues forward operation, the conveyor 12 is stationary, the scanner is enabled, the scale disabled, and the screen 11 displays as in Table II.

Now, touching the Table II location signifying that the customer is finished will cause advance to state "EE" during which the screen 11 displays Table III the subtotal is printed, only the outfeed conveyor 13 continues to operate, and timing of a 15 second interval commences. At the end of this interval the system returns to state "A". However, if the article is too large to clear the conveyor 13 into bagging area 14, or if the bagging area is overcrowded such that photo-optical beam 42 is interrupted, the outfeed conveyor 13 will continue to operate until such time as beam 42 is restored. So long as this condition prevails the processor 44 will prevent operation of laser 10 and conveyor 13, i.e., will delay state "A". Also, so long as curtain 37 is interrupted by one or more articles in bagging area 14, state "A" will be delayed.

One further example will be followed through after which one should be able to follow through any sequence of operation by referring to the state table. Again, commencing with state "A", an article is scanned and moved through position "A" to position "B" on conveyor 12 as

seen in Fig. 4. The resultant state is that appearing on line "B". The article will probably advance from position "B" to position "C" breaking curtain 33, and then via state "D" the curtain 33 will be restored with the sequence proceeding to state "I". The scanner is still disabled. By this point in time with the article at position "D", the weight should have been validated resulting in assumption of state "L" wherein the scanner is enabled. Assuming that a second item is scanned before curtain 34 is interrupted, the system shifts to state "N" with two items on the entry conveyor 12, one in the area "B" and the other in the area "D". At this point, depending upon relative positions of the two articles now on the conveyor 12, either the first or second curtain 33 or 34 will be interrupted. If curtain 33 is interrupted, the system progresses to state "Q". Assuming now that the second article proceeds beyond the first curtain to restore curtain 33, the system proceeds to state "T". The assumption here is that the next event will be a revalidation of the weight. Because two items are on conveyor 12, the measured weight must equal the total weight thereof. If a valid weight is confirmed, at state "T", the next state will be "X" whereupon the first item must break curtain 34, shifting to state "AA", followed by restoration of curtain 34 with the first item entering conveyor 13. Now the system will be at state "CC". At this point, the data regarding the item that has just passed through curtain 34 will be printed and the system will shift to state "I". Here, the second item requires validation of its weight which will cause the system to shift to state "L". If no further items are scanned and the item now at position "D" on the conveyor passes to position "E", the curtain 34 will be interrupted and the system will shift to state "P". Next, curtain 34 will be restored shifting the system to state "DD" where, if no further scanning takes place, after an elapse of 5 seconds the system will shift to state "G" where the screen 11 will display the completion query of Table II. Upon the customer touching the location of Table II on the screen, the system will shift to state "EE" during which the final display of Table IV below will appear on screen 11. When the preset 15 second time interval has elapsed, the system will now revert to the initial state of line "A" awaiting a new customer.

Table IV

Thank you for shopping at supermarket.

Please take your receipt and proceed to the cashier who will handle your coupons.
Please do not forget to take your cart.

Referring to the operating sequence just described, it is significant that at state "T" a valid weight is required to avoid assumption by the system of an illegal operation. That is, if the sequence is recalled, the weight of the first item was validated initially at state "D". Nevertheless, when a second item is placed on conveyor 12 before the first item has exited, the system requires that the weights be revalidated. Then it requires the first item to exit whereupon the weight of the second item is confirmed independently. This operation is designed to prevent fraudulent use of the system. For example, if the first item is at position "D" when the second item is legitimately at position "C" causing a break in curtain 33, the apparatus could not detect if the customer simultaneously passed a hand through curtain 33 and placed a third item on conveyor 12 at place "D" alongside the first item, unless the weight is now re-checked. Therefore, each time curtain 33 is interrupted, the weight must be revalidated before an item can pass curtain 34.

Another interesting condition involves the handling of long items. Such items would interrupt curtain 33 and arrive at curtain 34 causing interruption thereof before curtain 33 is restored. This must be treated as valid assuming that the weight was validated before interruption of curtain 34. An example, might follow the state sequence "A", "B", "D", "H", "JJ". At this point, curtain 33 must be restored prior to curtain 34. Therefore, a valid continuation of states would be "P", "DD", followed by either "B" or "G", etc.

Turning now to Fig. 7, the various components for implementing versions of the system of Fig. 1 are shown in further interconnected block diagram form, as such implementing the composite system version. Beneath entry conveyor 12 is article weight sensor 43 which, as noted above, responds to any change in the weight of the conveyor that is caused by articles being placed thereon or removed therefrom. Sensor 43 may be of any conventional structure and furnishes its output signal to central processing unit (CPU) 44 over line 100.

UPC reader 10, disposed outside of secured zone, furnishes its output signal to CPU 44 over line 102. CPU 44 is connected by line 104 to article accept/reject unit 106, which controls drive roller DR of conveyor 12 to effect selective forward (accept) and reverse (reject) conveyor motion, responsively to the state of line 104.

Article shape sensor 108, preferably realized integrally with entry curtain 33 as discussed below in connection with Fig. 8, provides output signal indicative of measured article height or shape on lines 110, which furnish same to CPU 44. Line 112 applies this signal also to shape comparator 114. Line 116 applies measured article weight to weight comparator 118. Where

height and weight comparisons are selected as system features, CPU 44 will, on the basis of predetermined values of height and weight available to it through storage, furnish output signal indicative of stored height on line 120 and shape comparator 114 will compare the height values on lines 112 and 120 and furnish output signal indicative of the result of the comparison over line 122 to CPU 44. Similarly, CPU 44 will furnish output signal indicative of stored weight on line 126 and weight comparator 118 will compare the weight values on lines 116 and 126 and furnish output signal indicative of the result of the comparison over line 128 to CPU 44.

UPC reader 130, disposed within secured zone 15, provides output signal to CPU 44 over line 132 indicative of the UPC of an article in the secured zone. EAS tag detector 134, also disposed within secured zone 15, provides output signal to CPU 44 over line 136 indicative of whether or not an article in the secured zone has or does not have an EAS tag.

Where separate from article shape sensor 108, as in Fig. 7, entry light curtain 33 provides output indication of its interruption to CPU 44 over line 138.

Memory 140 is connected to CPU 44 by lines 142 and 144, for communication therebetween of UPC, weight and shape values for storage, and measured weight and shape values for storage. Line 146 connects CPU 44 to receipt printer 16.

CPU 44 will be seen to have various possible inputs, comprising UPC read outside the secured zone, UPC read inside the secured zone, measured article weight, measured article shape, results of measured and stored weight and height comparisons, entry curtain violation, and presence or absence of EAS tags. A signal may also be provided on line 147 indicating exit curtain violation. CPU 44 operates responsively to such input signals in two main capacities, i.e., in controlling the state of line 104 and hence conveyor movement and in itself compiling the store of predetermined target values for article weight and shape, as will be discussed following comment on suitable structure integrating light curtain 33 and shape sensor 108 and for implementing inside UPC reader 130.

Broadly viewed, CPU 44, comparators 114 and 118 (which may be implemented within the CPU), article accept/reject unit 106 and memory 140 constitute a control means of the system of Fig. 4, governing conveyor movement.

Turning to Fig. 8, LED multiplexer unit 148 provides output signals on lines 150a, 150b and 150n to LED A, LED B and LED C of array 31 of the entry light curtain. The phantom outline of an LED between LED B and LED N is intended to indicate that the showing of Fig. 8 would include many more than the three LEDs therein. Counter 152 is a self-resetting counter and, as labeled, resets to zero count upon reaching its nth counts, n being the number of LEDs in array 31. The state of counter 152 is indicated on its output lines 154a, 154b and 154n, and is furnished to multiplexer 148 over lines 156. As counter 152 cycles, multiplexer 148 will selectively energize the LEDs in succession, one at a time.

PC array 32 of the entry light curtain is shown as including corresponding photocells, PC A, PC B, omitted phantom-outlined PCs and PC N, which furnish their output signals to PC multiplexer unit 158 over lines 160a, 160b, omitted phantom-outlined PC output lines and 160n. Lines 162 furnish the state of counter 152 to PC multiplexer unit 158, such that it operates in the same sequence and in time step with LED multiplexer 148. The entry curtain is accordingly stepped in vertical steps and the output lines 110 of PC multiplexer unit 158 will selectively indicate the initial vertical LED-PC pair in communication with one another and hence will indicate article height.

Operation of counter 152 is at high periodic cycling in comparison to the speed of movement of conveyor 12, such that many article height readings are made in the course of article conveyance. Further, the effects of ambient light are preferably overcome by chopping LED excitation at a given frequency, thereby to permit ready discernment in the PCs of LED output energy as contrasted with ambient light.

In Fig. 9 is indicated a version of inside UPC reader 130. Alphanumeric recognition unit 166 is operative to sense and locate article UPC within the secured zone and provides outputs on lines 168 and 170 for vertical and horizontal displacement of code reader drive 172 which supports reader 174 by links 176 and 178 for movement into sensed location for providing output indication of articles UPC.

The first system version in accordance with the invention may have the flow chart indicated in Fig. 10. Following entry of CPU 44 into this program (ENTER), step 180 (PLACE CONVEYOR IN CONTINUOUS ADVANCE) is practiced, wherein conveyor 12 is advanced in direction advancing articles into secured zone 15. In step 182 (STORE ARTICLE UNIVERSAL PRODUCT CODE (UPC)), the UPC read by reader 10 is stored for use in accessing system memory to obtain article shape or other stored article characteristics.

The CPU now, in step 184 (OBTAIN ARTICLE HEIGHT FROM LIGHT CURTAIN), looks at its input lines 110 and determines article height from the entry curtain. Article predetermined height value is now obtained from storage in step 186 (OBTAIN TARGET ARTICLE SHAPE FROM SYSTEM MEMORY). Decision as to correspondence or non-correspondence in measured

and stored article heights is made in step 188 (? IS MEASURED ARTICLE SHAPE WITHIN TARGET), the CPU looking to the state of line 122 of Fig. 7 for the latter decision. Upon article height correspondenc , flow proceeds to step 190 (GOTO ENTRY). In the case of non-correspondence, flow proceeds to step 192 (REVERSE CONVEYOR), which is an article rejection measure.

5 A second system version in accordance with the invention may include steps 180 and 182 of Fig. 10 and then the steps shown in Fig. 11. In step 194 (FETCH STORED UPC READ OUTSIDE SECURED ZONE), the CPU obtains the code stored in step 182. In step 196 (STORE UPC READ INSIDE SECURED ZONE), the CPU looks to its input line 132 of Fig. 7 and obtains 10 the output of inside reader 130. In step 198 (? IS INSIDE UPC IN CORRESPONDENCE WITH OUTSIDE UPC), the CPU effects the required comparison for the second system version. If the comparison is affirmative, flow proceeds to step 200 (RETURN), which is intended to connote a returning to the outset, i.e., step 180. Otherwise, step 202 is practiced (REVERSE CONVEYOR).

A third system version in accordance with the invention may also include steps 180 and 182 15 of Fig. 10 and then the steps shown in Fig. 12. In step 204 (FETCH STORED UPC READ OUTSIDE SECURED ZONE), the CPU obtains the code stored in step 182. The inquiry is now made of step 206 (? SHOULD ARTICLE HAVE AN EAS TAG). In implementing the system under discussion, one approach is that of selective EAS-tagging of articles, e.g., to tag only the more expensive articles which are most suspect to fraud on the part of a customer. For instance, in a 20 facility selling expensive wines, a customer aware of height and weigh measurement capabilities of a system may endeavor to defeat the system by UPC-scanning an inexpensive wine bottle of like size and weight to the expensive wine bottle and then place the expensive bottle on the entry conveyor. Assuming the system in such facility not to include the second UPC reading aspect of Fig. 11, the effort at fraud would be successful if the weight and height of the 25 expensive bottle were within target of the stored values associated with the UPC of the inexpensive wine bottle.

Considering the UPC scanned article not to be a tagged article by designation, such information would be in system store and the answer to the inquiry of step 206 would be in the negative. Flow would accordingly proceed to step 208 (? EAS TAG PRESENT) and its inquiry. In 30 the example under discussion, the expensive wine bottle would bear a tag, and same would be known as present to the CPU from its input line 136. An affirmative under these circumstances to the inquiry of step 208 will give rise to practice of step 210 (REVERSE CONVEYOR) and article rejection. Where there is no fraudulent substitution, and the inexpensive wine bottle is indeed in the secured zone, the inquiry of both steps 206 and 208 will be answered in the 35 negative and step 212 (RETURN) is reached.

Practice complementary to that of steps 206 through 210, if desired, will occur when the step 206 inquiry is answered in the affirmative. Thus, step 206 (? EAS TAG PRESENT) would be answered in the affirmative and flow would be to step 214. In the event that there should be a tag on the article and it is not present, step 215 (REVERSE CONVEYOR) is reached and the 40 article is reversed.

In each of the several discussed versions of systems in accordance with the invention, a light curtain routine such as that shown in Fig. 13 can be implemented to detect violation of same. By the inquiry of step 216 (? HAS ENTRY LIGHT CURTAIN BEEN INTERRUPTED), the CPU is apprised of the entry of an article into the secured zone. In the absence of affirmative reply, the 45 routine cycles through this step. On affirmative reply, obtained by CPU inspection of lines 110 input thereto, flow proceeds to step 218 (? HAS EXIT LIGHT CURTAIN BEEN INTERRUPTED) and the routine cycles again until positive reply. This brings on step 220 (? HAS ENTRY LIGHT CURTAIN AGAIN BEEN INTERRUPTED PRIOR TO INTERRUPTION OF EXIT LIGHT CURTAIN), wherein the CPU resolves by use of its various inputs the issue of whether the entry light curtain 50 has been interrupted, other than by anticipated and discerned entry of other articles as indicated by correspondence in number of UPC reading and entry of other articles, prior to exit of the article under consideration. If the answer to the step 220 inquiry is positive, step 222 (REVERSE CONVEYOR) is practiced. Otherwise, flow is to step 224 (RETURN).

A composite version of system in accordance with the invention may follow the flowchart of 55 Figs. 14 and 15. Following ENTER, step 226 (? STORE SETUP MODE) inquiries as to whether the system should proceed to a mode discussed below in which it itself compiles the system data base by processing output signals of its various components and loading memory therefrom. If yes, flow would be to step 228 (GOTO SETUP), which is practiced as discussed in connection with Fig. 16 below. Assuming the contrary, step 230 is reached (PLACE CONVEYOR 60 IN CONTINUOUS ADVANCE), and then step 232 (STORE ARTICLE UNIVERSAL PRODUCT CODE (UPC)), both discussed above.

Step 234 is now reached (DO LIGHT CURTAIN ROUTINE) wherein the system looks to violation of its light curtains as above discussed. In step 236 (STORE MEASURED ARTICLE SHAPE), the system operates as previously covered. Step 238 (STORE MEASURED ARTICLE 65 WEIGHT), calls for the CPU to look to its line 100 input signal from article weight sensor 43 of

Fig. 7 and to store such indication. In step 240 (OBTAIN TARGET ARTICLE WEIGHT AND SHAPE FROM SYSTEM MEMORY), the CPU prepares for the comparisons of measured and stored height in step 242 (? IS MEASURED ARTICLE SHAPE WITHIN TARGET) and of measured and stored weight in step 244 (? IS MEASURED ARTICLE WEIGHT WITHIN TARGET). If either of these inquiries are answered negatively, flow proceeds to the corresponding REVERSE CONVEYOR practice in steps 246 and 248. 5

If the inquiries of both of steps 242 and 244 are answered in the affirmative, flow proceeds to step 250 (PERFORM UPC CHECK ROUTINE), wherein the above-discussed routine involving comparison of outside and inside detected UPCs is practiced. Following acceptance of the article in step 250, the system advances to step 252 (PERFORM EAS CHECK ROUTINE), wherein the above-discussed routine involving EAS tag detection and processing is practiced. On successful EAS examination, the system returns via step 256 (GOTO ENTER). 10

The SETUP mode of operation of the invention is shown broadly in the flowchart of Fig. 16. As alluded to above, this system mode permits the compilation of an independent store of data useful in its operation in the several embodiments heretofore discussed, thereby gaining an independence from the UPC-related data base of the facility in which the system may be installed. Of course, the in-place facility data base may be used in the absence of SETUP in the foregoing systems. 15

Turning to Fig. 16, in entering SET UP, step 258 (PLACE CONVEYOR IN CONTINUOUS ADVANCE) and step 260 (STORE ARTICLE UNIVERSAL PRODUCT CODE (UPC)) are practiced as above discussed. In step 262 (? IS THERE A COMPLETED RECORD FOR THIS UPC), the inquiry is whether, by reason of previous operation of SETUP for the UPC at hand, a complete record of needed information has been compiled. If the answer to this inquiry is affirmative, then flow is to step 270 (RETURN). If negative, flow is to step 264 (MEASURE ARTICLE WEIGHT AND STORE IN RECORD), wherein the weight sensor output for the article on the conveyor is stored as the target weight. Desirably, such stored weight is given only transitional merit and is not considered the target or fully established value for the data base until the same article again is considered for weight in subsequent SETUP and concurrence between the transitionally stored and subsequently measured weight occurs. For the broad flowchart of Fig. 16, however, the initially taken weight measure is taken as the established target weight. 20

In the course of transport of articles through the entry light curtain, an article may exhibit as many as three quite different heights. Considering canned good, same may be upright, in which case the light curtain will measure the length of the cylindrical can as its height, or it may be lying on its side, in which case the light curtain will measure the can diameter as its height. In the case of a box, same has three possible dimensions length, width and height, each of which can be presented to the light curtain depending on the disposition of the box on the conveyor. 25

SETUP preferably looks to the storage of all possible acceptable light curtain or article shape sensor measurements for each article. This practice is undertaken seriatim each time the article passes through the light curtain in successive SETUP practices in step 266 (MEASUREMENT ARTICLE HEIGHT AND STORE IN RECORD AS ONE OF H1, H2 or H3 IF DIFFERENT FROM PREVIOUS HEIGHT RECORDED). Typically, measured height is compared with previously stored height or heights in the article record. If the currently measured value does not correspond to a previously stored value, and the record is not complete, the measure is adopted as one of H1, H2 or H3, as the case may be. Redundancy is also the desirable practice in this instance, as noted above for weight, but is omitted for convenience from the broad flowchart of Fig. 16. 30

In step 268 (? HAVE ALL OF WEIGHT AND H1, H2 AND H3 BEEN STORED IN RECORD FOR THIS UPC), inquiry is made as to whether the record for the article under consideration is complete. If the answer is negative, a RETURN is made in step 270. If affirmative, step 272 (STORE INDICATION OF COMPLETED RECORD FOR THIS UPC AND RETURN) is practiced such that information is available to permit a RETURN directly upon the inquiry in step 262 above discussed. 35

Various modifications to the foregoing systems and changes in the described methods can be made without departing from the invention. Accordingly, it will be understood that the illustrated preferred embodiments and practices are intended in an illustrative and not in a limiting sense. The true spirit and scope of the invention is set forth in the following claims. 40

CLAIMS

1. A system for processing articles selected for purchase and bearing distinct identification codes, said system including:
 - (a) code reader means for generating an output signal indicative of such article identification code; 45
 - (b) conveyor means for receipt and transport of such article;
 - (c) sentry means for defining an inlet to a security zone extending along a portion of said conveyor means;
 - (d) sensor means for sensing a measurable characteristic of such article and generating an 50

output signal indicative of such article characteristic; and

(e) control means for selective movement of said conveyor means in respective article acceptance and article rejection senses, and control means being operable

- I. for storage, for each of a plurality of such articles, of a signal indicative of a predetermined value of said article characteristic correlated with such article identification code, 5
- II. for response to said code reader means output signal for comparison of such stored signal with said output signal of said sensor means, and
- III. for operation of said conveyor means selectively in response to the results of such comparison.
- 10 2. A system according to claim 1 wherein both said sentry means and said sensor means are constituted by common sensing apparatus. 10
3. A system according to claim 1 further including additional code reader means in said security zone for generating an output signal indicative of such code, said control means being operable for further comparing said output signal of said first-mentioned code reader means with 15 said output signal of said additional code reader means and operating said conveyor means selectively in response to such further comparison. 15
4. A system according to claim 1 further including EAS detection means for determining whether or not an article in said security zone is EAS-tagged, said control means being operable for storing indication, for each of a plurality of such articles, of whether or not such article 20 should be EAS-tagged and operating said conveyor means selectively in response to such stored indication and determination. 20
5. A system according to claim 1 wherein said control means is operable for compiling such store, for each of a plurality of such articles, of a signal indicative of a predetermined value of said article characteristic correlated with article identification code by processing of said output 25 signals of said code reader means and said sensor means. 25
6. A system according to claim 3 further including EAS detection means for determining whether or not an article in said security zone is EAS-tagged, said control means being operable for storing indication, for each of a plurality of such articles, of whether or not such article 30 should be EAS-tagged and operating said conveyor means selectively in response to such stored indication and determination. 30
7. A system according to claim 6 wherein said control means is operable for compiling such store, for each of a plurality of such articles, of a signal indicative of a predetermined value of said article characteristic correlated with article identification code by processing said output 35 signals of said code reader means and said sensor means. 35
8. A system according to claim 4 wherein said control means is operable for compiling such store, for each of a plurality of such articles, of a signal indicative of a predetermined value of said article characteristic correlated with article identification code by processing said output 40 signals of said code reader means and said sensor means. 40
9. A system according to claim 1 wherein said sensor means output signal is indicative of article shape, said system further including article weight sensing means for generating an output signal indicative of the weight of said article on receipt thereof by said conveyor means, said control means being further operable for storage, for each of a plurality of such articles, of a signal indicative of a predetermined value of said article weight correlated with article 45 identification code, for response to said code reader means output signal for comparison of such stored weight signal with said output signal of said weight sensing means, and for operation of said conveyor means selectively in response to the results of such weight signal comparison. 45
10. A method for use of the system claimed in claim 1 in purchase checkout of articles having respective unique identification codes therewith, said method including the steps of:
 - (a) discerning such identification code for an article selected for purchase;
 - 50 (b) disposing such selected article in a secured zone and therein, 50
 - I. measuring a characteristic of such secured zone disposed article and
 - II. at least one of
 - A. again discerning such identification code for said article, and
 - B. examining said article by EAS practice; and
 - 55 (c) rejecting said disposed article from such secured zone and returning to the purchaser upon 55
 - I. failure of correspondence of such measured article characteristic with a stored predetermined value of such article characteristic, or
 - II. at least one of
 - A. failure of correspondence of such second discerned identification code for said article with 60 such first discerned identification code therefor, and 60
 - B. failure of such article to pass such EAS examination thereof.
 11. A method according to claim 10 wherein said article characteristic is article shape, said step (b)I. being practiced in the course of entry of said article into said secured zone.
 12. A method according to claim 11 including the further practice of measuring article 65 weight and rejecting said disposed article from said secured zone and returning same to said 65

purchaser upon failure of correspondence of such measured weight with a stored predetermined value of weight for said article.

13. A system for processing articles selected for purchase and bearing distinct identification codes, constructed and arranged to operate substantially as herein described with reference to and as illustrated in the accompanying drawings.

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